Remarks:

Applicants have amended claims 24-29, and 30-38 to refer to the term "the unique" sequence of interest and "the same" sequence to comply with the requirement of antecedent basis for the terms in the claims. Similarly, Applicants have amended claim 11, as indicated, *supra*, to comply with the requirement of antecedent basis for the terms in the claims. Claim 11 has been further amended to clarify that in this embodiment, each expended oligonucleotide attached to the array has a unique sequence. Support for this amendment can be found throughout the specification, for example page 10, lines 25-29. Accordingly, no new matter is introduced by the amendments and their entry is respectfully requested.

The Examiner objected to claims 24-29, 34, and 35 because they referred to "the sequence of interest" and suggested that they should refer to "the unique sequence of interest." Applicants have amended the claims as suggested by the Examiner. Accordingly, the objection has been obviated.

The Examiner also objected to claims 24-29, 34, and 35 because they referred to "a same" sequence and suggested that they should be amended to refer to "the same." Applicants have amended the claims as suggested by the Examiner. Accordingly, the objection has been obviated.

The Examiner also objected to claims 11 and 23 because they use the article "a" before the term "unique." The Examiner requested that the article be changed to "an unique." While Applicants respectfully disagree for the reasons of record, namely, because words that begin with a vowel in English language, while typically preceded with the article "an" must be preceded by the article "a," if the vowel is pronounced like a consonant, Applicants have amended the claims as requested by the Examiner to expedite prosecution. Therefore, Applicants respectfully submit that the objection has been obviated.

The Examiner rejected claims 11, 23-29, 34, and 35 as allegedly failing to comply with 35 U.S.C. §112, first paragraph written description requirement. The Examiner alleged that the claims introduce new matter. Specifically, the Examiner alleged that the following recitation includes new matter: "multiple copies of a sequence of interest extending in the array's z dimension, wherein each copy has an identical genetic [claims actually read "**generic**"]

oligonucleotide that is attached to the array's x and y coordinates and wherein each copy also carries a unique sequence of interest repeated at least two times in the z dimension of the array" (emphasis added).

Applicants respectfully submit that the claims did not introduce new matter. Applicants have prepared a claim chart for claim 11 with respect to the passage cited by the Examiner. The chart, below, clearly shows that **each element** included into the claim is **fully supported in the specification**.

Claim	Support in Specification
11. An ordered array of immobilized oligonucleotides in the array's **x and y coordinates**	At each position (e.g., **x1, y1**; x2, y2), a oligonucleotide is immobilized (p. 10, ll. 10-12).
with multiple copies of a sequence of interest extending in the array's z dimension,	To create an array with diverse sequences, a circular DNA template is added at each position (e.g., by a robot), wherein **each circular DNA template** added has a **unique sequence of interest** (e.g., a different sequence corresponding to a unique portion of a target). Each circular DNA template is added under conditions such that the circular DNA template **hybridizes with the generic immobilized oligonucleotide**, said immobilized oligonucleotide thereafter being extended by a polymerase **to create a unique extended nucleic acid strand at each position on the solid support**, such extended strands comprising **two or more** (and more typically three or more, and more preferably, ten or more, and still more preferably more than fifty) copies of the sequence of interest. Thereby, **an array is created with redundancy in the z dimension (i.e., out of the x**

	and y plane of the solid support) (p. 10, lines 25-29-p. 11, lines 1-6).
wherein each copy has an identical generic oligonucleotide that is attached to the array's x and y coordinates and	At each position (e.g., **x1, y1**; x2, y2), a oligonucleotide is immobilized (p. 10, ll. 10-12). In one embodiment, the **same** oligonucleotide (i.e., an oligonucleotide with the same **generic nucleotide sequence) is immobilized in every position**… on the solid support" (p. 10, lines 10-15).
wherein each copy also carries a unique sequence of interest repeated **at least two times** in the z dimension of the array and…	**…**to create **a unique extended nucleic acid strand** at each position on the solid support, such extended strands comprising **two or more** (and more typically three or more, and more preferably, ten or more, and still more preferably more than fifty) **copies of the sequence of interest**. Thereby, **an array is created with redundancy in the z dimension (i.e., out of the x and y plane of the solid support)** (p. 11, lines 1-6).

Therefore, for example, the array formed, and claimed in claim 11, has a generic nucleic acid portion attached to the solid surface on each location defined by x and y coordinates on the two dimensional plain. The generic nucleic acid is extended in the third dimension (z) so that the extended portion has the desired unique nucleic acid sequence repeated two or more times. The array is formed using the rolling circle amplification method. Therefore, as described in the specification, each unique sequence of interest has a spacer between the repeats, wherein the spacer has the sequence which originally was used to attach the rolling circle to the generic nucleic acid (i.e. in claim 11, a portion of the generic nucleic acid). Thus, the array has a unique repeated probe at each x, y location. A drawing showing the resulting claimed array is attached herewith as Exhibit A. An example of only four different z-dimensionally extended probes on the array are shown for the sake of clarity. The drawing shows that each x, y coordinate has a

generic oligonucleotide attached thereto. The drawing further shows that each generic nucleotide is extended in z-dimension so that each x, y location has a unique sequence extending from it.

Accordingly, Applicants respectfully submit that the rejection of claims 11, 23-29, 34, and 35 under 35 U.S.C. §112, first paragraph is improper and should be withdrawn.

The Examiner also rejected claims 11, 23-29, 34 and 35 as allegedly not complying with 35 U.S.C. 112, second paragraph.

Applicants respectfully submit that the rejection be withdrawn for the following reasons.

The amendment to claim 11 has obviated the antecedent basis objection.

Turning to the objection to claims 11 and 23 regarding what sequence in a target sequence can be considered unique. Applicants respectfully submit that pages 10 and 11 of the specification describe what is meant by this. The term unique describes each repeated probe on the array. Each extended probe on the array has a unique target sequence. Due to the method of creating redundancy (rolling circle method), the unique sequence that corresponds to any target selected to be on the array is typically flanked at least by one nucleic acid sequence that is selected to be generic (e.g. part of the generic nucleic acid that attaches the probes to the array). If the original circular template that comprises the desired target sequence has additional spacer sequence, that spacer sequence will also be part of the probe but will not be referred to as a target (see, e.g., Figures 1A and B). Applicants respectfully submit that based on the description in the specification, the skilled artisan knows that the unique sequence refers to a sequence in the target nucleic acid (i.e. the sequence to be detected) and to a sequence that permits one to identify the target nucleic acid as opposed to any random nucleic acid.

Turning to claim 11, the claims are referring to growth in the z direction, which is attached to the strand at its x, y position. The Examiner contends that if the rolling circle is hybridized on the immobilized probe, it will not extend to z dimension but rather to x, y dimension. Applicants refer to the drawings and the specification in whole in responding that this is not the case. In an array, the position of each probe is defined by its location on the array with x and y coordinates. Each of the probes will thus always extend to the third dimension, i.e. z dimension. Even the generic part of the probe will extend to the third dimension, because the

arrays form a three dimensional space for detection (see also, Exhibit A). Therefore, once the rolling circle attaches to the initial probe attached to the solid surface, it cannot go along the array, but must extend outwards when the polymerase extends it.

Turning to claim 23. The claim refers to multiple sequences of interest which are different from each other. This is clearly described in the specification, at pages 10-11. Applicants describe that each probe contains a different sequence of interest (see, e.g. p. 10, lines, 23-29). The Examiner contended that because the claims refer to the different sequences being complementary to the sequence of interest, the claim is not clear. The basic principle of the method by which the arrays are created is the novel use of rolling circle amplification (RCA). As explained in the specification, and shown in the drawings, such as Figures 1 and 2, the original circle contains the sequence of interest (or its complement). Once this circle hybridizes with the probe attached on the solid surface, a polymerase is used to create at least two linear repeats of the circle thereby making the extended probe a complement of what the circle originally consisted of. The term "complement" is a term of art. The skilled artisan understands what the term complement to a target sequence refers to. The claim language is consistent with language understood by one skilled in the art.

The specification also shows and describes that the extended probes are linear (see, e.g., Figure 2). Paragraph (d) of claim 23 indicates that the 3' terminus is made form a circular template—not that the termini must be circular.

In view of the above, Applicants respectfully submit that the rejection of claims 11, 23-29, 34 and 35 under 35 U.S.C. 112, second paragraph, should be withdrawn.

Claims 11, 23-29 being apparently free of prior art should therefore be in condition for allowance.

The Examiner also rejected claims 30-33 and 36-38 as allegedly anticipated under 35 U.S.C. §102(e) over U.S. Patent No. 5,753,439 to Smith. The Examiner argued that "the claims do not require that the 3' terminus of each extended immobilized oligonucleotide is the same." The Examiner further argued that the claims do not require that "a separate region is at the end of the variable region of each probe and the 3' end of the probe is unique."

Applicants respectfully submit that the rejection be withdrawn for the following reasons.

Regarding the Examiner's comment that "the claims do not require that the 3' terminus of each extended immobilized oligonucleotide is the same", Applicants respectfully submit that this is correct. That is what Smith teaches, i.e. the terminus must be the same, and the claimed array is very different from what Smith teaches. Smith teaches that each probe is "capped" with an identical 3' end and an identical 5' end (see Exhibit A, attached herewith). The Smith array is directed to arrays of probes wherein each probe attached to a surface has "a constant 5' region, a constant 3' region, and a variable internal region wherein the variable region comprises one or more repeat sequences. The repeat sequence comprises heterologous or homologous sequences which are variable in length or base sequence." (col. 3, lines 7-25 of Smith).

The present claims require a unique sequence at the z-dimension at the end of each probe. This is unlike Smith, where the each probe has an identical sequence at the end of each z-dimension probe. The significant difference between the array of the present invention and the arrays as described in Smith should be clear from the drawing.

A clear reading of the present claims, and Smith shows that they are different. While claims are read broadly, they must still be read in a reasonable way. A comparison shows that what is being claimed is not the same as disclosed in Smith.

In view of the foregoing, applicants submit that all claims are in condition for allowance. Early and favorable action is requested.

The Commissioner is herewith authorized to charge any fee deficiencies or credit any overpayments associated with this submission to the Nixon Peabody LLP Deposit Account No. 50-0850.

Respectfully submitted,

Date: October 25, 2007

/Leena H. Karttunen/

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